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拒絶理由通知書

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適用条文	第 2 9 条第 2 項

この出願は、次の理由によって拒絶をすべきものである。これについて意見があれば、この通知書の発送の日から 3 か月以内に意見書を提出して下さい。

理 由

1. この出願の下記の請求項に係る発明は、その出願前日本国内又は外国において頒布された下記の特許文献に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第 2 9 条第 2 項の規定により特許を受けることができない。

記 (引用文献等については引用文献等一覧参照)

・ 請求項 1 - 6、8 - 1 6、1 8 - 2 3 (文献 A - D 参照)

文献 A には低電力休眠モードをもつ ADSL モデムが記載されている。また、コネクタが非接続状態の時に使用されない部分の動作を停止することは本願出願前周知であり (文献 B、C 参照)、信号の有無により接続状態を検出することは文献 D に記載されている。

・ 請求項 7、1 7 (文献 A - E 参照)

文献 E の図 1 を参照

拒絶の理由が新たに発見された場合には拒絶の理由が通知される。

引 用 文 献 等 一 覧

- A.特表 2 0 0 3 - 5 1 8 3 4 1 号公報 (国際公開日平成 1 2 年 8 月 3 日)
- B.特開平 1 1 - 8 5 3 4 7 号公報
- C.特開 2 0 0 0 - 2 5 3 1 7 2 号公報
- D.D. Macq et al , A COMS activity detector for ADSL link ,
ESSCIRC'95 TWENTY-FIRST EUROPEAN SOLID-STATE CIRCUITS CONFERENCE ,
フランス , 1995 年 9 月 , p.430-433
- E.特開 2 0 0 0 - 1 6 5 5 1 7 号公報

なお、文□ D は文□ A の□際調査報告にあげられたものである

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CLAIMS

[Claim(s)]

[Claim 1] It is the multi-carrier transceiver which has a sleep mode function. A sleep mode instruction is answered. A means to reduce the power to the part as which the transceiver circuit was chosen while memorizing the selected state parameter with the above-mentioned transceiver peculiar to a working channel, recovery instruction is answered, and while recovering the condition of the above-mentioned transceiver from the above-mentioned sleep mode, it has a means to recover the power to the above-mentioned transceiver. Multi-carrier transceiver which makes recovery of a communication link easy, without carrying out reinitialization of the above-mentioned transceiver.

[Claim 2] The above-mentioned state parameter is a multi-carrier transceiver according to claim 1 which are one or more parameters chosen from the group which consists of the phase shift and transmission-line gain of a frequency domain equalizer multiplier, a time domain equalizer multiplier, an echo canceller multiplier, the frequency drift of the phase locked loop, and the phase locked loop.

[Claim 3] A multi-carrier transceiver [equipped with a means to receive the signal which determines timing criteria during the sleep mode period of the above-mentioned transceiver at least from another transceiver] according to claim 1.

[Claim 4] The above-mentioned signal is a multi-carrier transceiver according to claim 1 which consists of pilot tones.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

Background of invention This invention consists of the approach and equipment which form control-of-electric-power dormant state in a multi-carrier method about a multi-carrier transmission system.

[0002]

Outline of invention A multi-carrier transmission system realizes a high-speed data link between communicating points. Such a method is introduced into the communication link through the subscriber's loop which connects a call-service subscriber to the telephone exchange, and the common name is carried out to the "xDSL" method in this important application in recent years. Here, "x" points out the specific variety of a DSL (digital subscriber's loop) communication link, for example, ADSL (asymmetrical type digital subscriber's loop), HDSL (high-speed digital subscriber's loop), etc. On these descriptions, these will only be generically called the "DSL" method. By such method, the transceiver of a couple communicates with others by dividing into the subchannel according to individual of a large number which have the bandwidth limited, respectively in the total bandwidth of the transmission line which connects the telephone exchange mutually with a subscriber, and work to juxtaposition mutually. For example, one common system is divided into 256 subchannels which have the bandwidth of 4kHz for a subscriber's-loop transmission line, respectively, those 1st group (for example, 196 pieces) is assigned to the communication link to a subscriber from the telephone exchange (this -- " -- getting down -- " -- known as a direction), and the 2nd group (for example, 55 pieces) is assigned to the communication link to the telephone exchange from a subscriber (this -- " -- going up -- " -- known as a direction). The remaining subchannel is assigned to management, control, and an overhead function.

[0003]

The data which communicate through a link are divided into two or more bit groups which turn into one group for every subchannel. The bit group assigned to a certain specific subchannel is modulated by one subcarrier which has a frequency peculiar to the channel. Generally, a quadrature amplitude modulation (QAM) is used for this object, and a bit group is matched with the vector specified by one of the points of a "spacial configuration" which specifies the data point which enables transmission which let that subchannel pass at the specific event. Thereby, each vector, i.e., a data point, consists of signs of a meaning expressing the characteristic bit pattern for being transmitted as one group through the corresponding subchannel. During the period (usually called a "sign period" or a "frame") assigned in order to transmit one sign, as each subchannel can transmit the data of a large quantity at the time of each frame, it transmits a sign to all subchannels and juxtaposition. [other]

[0004]

The number of bits conveyed by one sign is influenced by the property of a subchannel that it is transmitted. They may differ for every subchannel. The 1st determinant is the signal-to-noise ratio of a subchannel. Therefore, it asks for the number of bits which may be transmitted at the event of a certain specification by that subchannel by measuring this parameter periodically and checking that value for every subchannel.

[0005]

The telephone transmission line is wearing many defects which must be compensated, in order to secure reliable transmission. Usually, the phase (delay) distortion of a transmission signal has been restricted most among these defects. Unless a cure is taken, this distortion makes a signal distorted and makes the possibility of detection of an error increase depending on a frequency, when various frequency components of one signal so displace in various amount. For this object, generally, a frequency delay equalizer (FDQ) and a time delay equalizer (TDQ) are incorporated in a transmission line, and phase (time amount) delay is equalized over that transmission-line frequency band.

[0006]

Other defects exist. For example, the signal attenuation depending on a frequency has an adverse effect on the signal transmission in the telephone line. This is compensated by using a gain equalizer on a circuit. The echo on a circuit also needs to amend a gap of the phase and frequency which may happen by it being coped with by using an echo canceller. for example, using Frequency Division Multiplexing for a telephone system.

[0007]

By the usual voice communication, although the problem of a signal defect puts a DSL communication link on a common circuit, in member's house, by the telephone exchange or its both, it is divided in the above-mentioned xDSL configuration which excludes the activity of a "splitter", and becomes serious. A "splitter" is a filter which strengthens whenever [between both / insulation] fundamentally while separating low frequency voice communication (for example, 0 thru/or 4kHz) with high frequency data communication (it may reach in a mega hertz band). When there is no splitter, it is necessary to take the special cure which provides voice communication and data communication with the same circuit. Refer to the copending application of the name "a splitter-less multi-carrier modem (Splitterless Multicarrier Modem)" of application number *** [/ else / gross / Richard / which was transferred to the grantee of this invention / (Richard Gross)], and filing-date-of-application *** for still more detailed explanation of this problem and its solution.

[0008]

Since the Internet communication link is broadly used also in other applications, of course, if a DSL transceiver is once introduced and is initialized, it has usually become with the "ON" condition in preparation for transmission and reception. Therefore, such a modem consumes the power of a large quantity, even when having not exchanged data actively. Also in order to prolong the life of a device also from the reason of an environmental side, generally it is desirable to restrict such power consumption. Furthermore, since a part or the whole is mounted in computer machines, such as home use and a business-use personal computer, or such a modem is incorporated, as for such a computer, an energy saving function means is provided increasingly. For example, El . dee . Harper (L.D.Harper) needs to apply, and please refer to the U.S. Pat. No. 5,428,790 number "a computer power control system (Computer Power Management System)" by which patent grant was carried out on June 27, 1995. Therefore, it is desirable to offer the ADSL Modem which can accept an energy saving function means.

[0009]

It is required to initialize it before data transmission and reception for conditions required to operate and and it with the complicated structure of a DSL transceiver. It divides to this initial setting and transmission-line amendment of adjusting a gap of "making it learn", setting up transmission-line gain, a phase, and a frequency to a frequency-domain equalizer, a time domain equalizer, and an echo canceller is included in it. Furthermore, measuring the S/N of each subchannel, computing a bit assignment table peculiar to each subchannel under specific transmission conditions, and exchanging those tables with other modems using a certain specific modem communication link are also included. Refer to the application of the above-mentioned Richard gross others incorporated in this description in the form of a citation for still more detailed explanation of these procedures. These procedures take several 10 seconds thru/or several 100 seconds. When introducing newly, the time amount to require is not important. However, after interrupting actuation in relation to an energy saving function temporarily since making a modem answer is expected so that an activity may be required usually almost immediately in installation in actuation, the time amount which takes a system initialization or to carry out reinitialization is not already accepted.

[0010]

Therefore, the object of this invention is offering the multi-carrier transmission system which has the sleep mode and the rapid actuation function of low power.

[0011]

Furthermore, the object of this invention is offering the multi-carrier transmission system for a digital subscriber's-loop communication link which can be switched quickly from the sleep mode to a perfect working state.

[0012]

A nest is easily possible for still more nearly another object of this invention to the computer which has the sleep mode of low power, and it is offering the DSL method in which the rapid return to full operation is possible.

[0013]

Detailed explanation of an operation gestalt Explanation of this invention is hereafter given based on an attached drawing.

[0014]

In drawing 1, the DSL transceiver 10 concerning this invention has the transmitting section 12 which transmits data through the digital subscriber's loop 14, and the receive section 16 which receives data from the circuit. the data stream (for example, binary digit string) of the serial [section / 12 / transmitting] for transmission -- receiving -- the data -- two or more pairs of the complex value signs X_i and conjugation $X_{N-i} = X_i^*$, $i = 0, 1, \text{ and } \dots$ it consists of input-buffer converters 18 changed into N . these sign pairs are applied to the reverse fast Fourier transform (IFFT) 20 -- having -- the real-time-output signal X_j , $j = 0, 1, \text{ and } \dots$ it is set to $N / 2 - 1$. Next, after the latter is changed into a series connected-type type with a serializer 22, it is applied to a digital-to-analog converter 24, and is applied to a line driver 26. A converter gives a patrol prefix to Signal X_j and copes with the intersymbol interference which a transmission medium causes. In case a driver 26 is applied to the communication channel of digital subscriber's loop 24 grade, it may also incorporate gain control section 26a which controls signal amplitude (therefore, output).

[0015]

It can also be considered that IFFT20 is a data modulator. Sign X_i and its conjugation X_{N-i} correspond to the data point which specifies the signal vector in the spacial configuration set of a quadrature amplitude modulation (QAM). A converter 18 forms

each sign from input data gaining exchange of the bit assignment table (BAT) 28 which specifies the data point relevant to the sign by it while specifying the number of bits which the sign transmitted through each subchannel carries for every subchannel. This table is usually computed by the transceiver and other transceivers enable it to decode the sign received from that transceiver by being transmitted to other transceivers by which that transceiver communicates.

[0016]

The number of bits which each sign carries is decided by the property of a subchannel that the sign is transmitted, especially the signal-to-noise ratio of the subchannel. This computational procedure is well-known. Drawing 1 A shows an example of a table which is formed and memorized by the transceiver 10. Thus, the sign transmitted through a subchannel 50 has 6-bit allocation, and, in the case of the sign of a subchannel 51, in the case of the sign of 6 bits and a subchannel 52, it may be decided like 7 bits.

[0017]

A clock 30 controls the timing of a transmitter 12 of operation. A clock inputs to the controller 32 which controls each equipment of a transmitter. When a transceiver is located in the telephone exchange, a clock 30 is usually a master clock with which the remote transceivers in member's house etc. can synchronize. As a transceiver shows for the purpose of instantiation, when it is located in member's house, a clock is taken out from the master clock of the telephone exchange so that it may explain in more detail below in relation to the receive section of a transceiver. A transceiver carries out counting of the frame number of the data transmitted or received, and memorizes the frame counter (FC) 36 connected to the controller 32. Finally, the condition memory (SM) connected to the controller 34 records the condition of a transceiver for the reason for explaining further below at a detail.

[0018]

When their eyes are turned to a receive section 16 here, it consists of the circuit controller 50, an analog-to-digital converter (ADC) 52, a deserializer 54, the fast-Fourier-transform (FFT) section 56, a detector 58, and a serializer 60. The controller 50 compensated transmission distortion which the circuit 14 induced, and, generally is equipped with frequency-domain equalizer (FDQ) 50a, time domain equalizer (TDQ) 50b, and (echo canceller EC) 50c especially. ADC52 changes an input signal into a digital format, and applies it to a deserializer 54. The patrol prefix added to the signal is removed before transmission, a converter 54 applies the signal acquired as a result to FFT56, and FFT "makes it restore to an input signal effectively." The output of FFT is applied to a decoder 58 and a decoder restores Sign Xi and its corresponding bit in cooperation with the bit assignment table 62. The output of a detector 58 is applied to a serializer 60, and, as for this transducer, origin restores the data stream applied to the transmitter.

[0019]

The phase locked loop (PLL) 62 receives the timing reference signal transmitted from the transmitter (for example, CO transceiver) which performs a communication link from the circuit controller 50. PLL62 is locked to this signal and operates a clock 64 synchronizing with the master clock in an actuation transmitter. A controller 32 performs control of a receive section.

[0020]

As stated previously, the transceiver of this invention will usually be built into computers, such as a personal computer. Actually, when it is not under activity, it may be mounted as some such indivisible computers that have an energy saving function possible [a startup]. Therefore, as for a transceiver, it is desirable that the "dormancy" mode in which suspend actuation and little power is consumed can be

started when there is no need for data transmission or reception, nevertheless transmission or reception can almost be resumed for example, by delay 1 or less second in an instant. This is realized as follows in this invention.

[0021]

An operation of this invention is explained about the transceiver (a "CPE transceiver" is called in the text) in the customer home which communicates the transceiver ("CO transceiver" is called in the text) and data of the telephone exchange through a customer's data subscriber's loop for instantiation. Suppose that drawing 2 and drawing 3 are especially referred to in relation to this explanation. the controller 32 of a CPE transceiver -- a powering-off instruction -- receiving (step 80) -- powering-off actuation of a CPE transceiver begins. A powering-off instruction may be given to a controller 32 from sources of the exterior, such as a personal computer having a transceiver, may supervise an input buffer 18, may be generated inside the transceiver itself as a result judged that predetermined time data is not given, and may answer a powering-off instruction from CO transceiver.

[0022]

If two cases of the beginning are considered for the time being, a CPE transceiver will answer the above-mentioned instruction by what (step 82) a "sleep mode initiation" signal is transmitted to CO transceiver for. CO transceiver answers by what (step 84) a "sleep mode check" signal is transmitted to a CPE transceiver for. Furthermore, CO transceiver transmits the pilot tone which makes the synchronization with CO transceiver maintainable to a CPE transceiver into the sleep mode (step 86). As shown in drawing 1, specifically, a pilot tone is given from the circuit controller 50 to PLL62 which operates a local clock 64 synchronizing with the master clock 30 of CO transceiver. A clock 64 also operates the frame counter 66 synchronizing with the frame counter 36 of CO transceiver.

[0023]

Furthermore, CO transceiver makes the condition memory 38 of a receive section memorize the condition (step 88). As for the condition, it is desirable to include a frequency-domain equalizer multiplier and a time domain equalizer multiplier (FDQ:TDQ), the echo canceller multiplier (ECC) of a receive section, and the gain of the transmitting section at least. Moreover, CO transceiver memorizes the frame number and the super frame number, and secures the synchronization with a remote (step 90) CPE transceiver. Under the present circumstances, CO transceiver may reduce the power of itself (step 92). Especially, the power to the transmitting section, and the digital modulation / recovery section of a receive section may be reduced or intercepted. Thereby, a drastic power cutback is attained. Of course, the power to the part of the analog driver circuit which transmits the control signal of a pilot tone or others to a CPE transceiver at least will be maintained.

[0024]

In response to the Acknowledgement from CO transceiver, a CPE transceiver starts the sleep mode to which small power is impressed to various components of a transceiver, or power is not impressed at all (step 94). Especially a CPE transceiver makes a frequency-domain equalizer multiplier and a time domain equalizer multiplier (FDQ:TDQ), the echo canceller multiplier (ECC) of a receive section, the gain of the transmitting section, and the condition containing the phase shift and frequency drift of the phase locked loop 62 of itself memorize at least preferably in the condition memory 38 (step 96). Then, a CPE transceiver drops the power source of the transmitting section containing digital modulation/demodulator circuit, and an analog network driver (step 98).

[0025]

Between sleep mode conditions, CO transceiver continues (step 100) supervising the

data subscriber's loop, and waits for the "recovery" signal from a CPE transceiver (step 104). A CPE transceiver is transmitted, when a "recovery" instruction is received from the external source or other sources, such as a computer by which itself is introduced for that controller in this signal, or when that controller detects that data exist in an input buffer 18 (step 102). A CPE transceiver recovers the total power to the circuit immediately there (step 106). Moreover, a CPE transceiver takes out the condition of having memorized from the condition memory 38 (step 108). Then, although indispensable parameters (an equalizer multiplier, an echo canceller multiplier, gain, a phase shift, a frequency drift of the phase locked loop, etc.) are set up, since a CPE transceiver does not need to repeat required initial setting before, it can start transmission promptly. of course, a front [event / this] -- the "recovery" signal from a CPE transceiver -- answering -- CO transceiver -- that power -- recovering (step 110) -- that condition -- recovering (step 112) -- it will be in a receivable condition (step 114).

[0026]

If a communication link is resumed, before starting transmission of user data, what (step 116) test (well-known) data of several frames are transmitted for may be desirable. Thereby, it can inspect whether the system is changing so a lot that the condition of a system needs renewal of initial setting. If satisfaction of a test goes (step 118), transmission of user data will occur (step 120). Otherwise, before transmitting user data, it is necessary to perform reinitialization (step 122).

[0027]

As stated previously, a transceiver 10 may awake by CO transceiver. As for this, it is desirable that the tone 120 (drawing 3) transmitted to the CPF receiver from the latter is realized. The tone is answered and a CPE receiver performs a series of steps shown in 100-110 of drawing 2.

[Brief Description of the Drawings]

[Drawing 1]

Drawing 1 is the block diagram of the multi-carrier transmission system concerning this invention.

[Drawing 2]

Drawing 2 is flow drawing of actuation of this invention.

[Translation done.]

